Abstracts

Oral 13

Reproduction

O13.1 FERTILITY AND EXPOSURE TO SOLVENTS AMONG FAMILIES IN THE AGRICULTURAL HEALTH STUDY

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Introduction: Data on the associations between exposure to solvents and reduced fertility as measured by prolonged times to conception are fairly consistent for female exposure, but inconclusive for male exposure. This study investigated the impact of solvent exposure on infertility among married male licensed pesticide applicators and their spouses in the Agricultural Health Study cohort.
Methods: Enrolment took place between 1993 and 1997, and 75% of the eligible couples participated. Cross sectional questionnaire information on work tasks was used to assess female and male exposure to solvents. To limit exposure misclassification, the data were limited to couples (wife less than 40 years of age) with an attempt at pregnancy in the last four years (n = 2112). Infertility was defined as not conceiving a pregnancy after at least 12 months of unprotected intercourse, regardless of whether or not a pregnancy ultimately occurred. Infertility odds ratios (OR) for exposure to solvents were calculated with logistic regression, with adjustment for potential confounders.
Results: Twenty eight per cent of the couples were defined as infertile. Female exposure to solvents was associated with infertility (OR 1.42, 95% CI 1.15 to 1.75). Male exposure was associated with infertility in a dose-response pattern (OR 1.21, CI 0.93 to 1.57 for monthly exposure and 1.40, CI 0.97 to 2.03 for daily or weekly exposure). Because farming is a family business and jobs may be passed back and forth between husbands and wives depending on the family circumstances, we also defined a variable for parental exposure (either parent reported exposure). Parental exposure to solvents was even more strongly associated with infertility (OR 1.62, CI 1.20 to 2.17). The findings were consistent across several sensitivity analyses.
Conclusion: Solvents may impair both female and male fertility, though the evidence for female effects is stronger than for male effects.

O13.2 TIME TO PREGNANCY AMONG WOMEN IN DENTAL CARE WORK

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Introduction: Dental care personnel may be exposed to mercury, acrylate compounds, disinfectants, solvents, and nitrous oxide. The aim of the study was to investigate whether the exposure of dental care personnel to these chemical agents is associated with decreased fertility.
Methods: A retrospective time to pregnancy study was conducted among female dental care workers and their referents including pharmacists, and secretaries and receptionists in health care. The subjects were participants of a case control study on spontaneous abortions. Data on time to pregnancy as well as work tasks and occupational exposure preceding pregnancy were collected by self-administered, mailed questionnaires. The response rate was 68%. The final study population consisted of 570 women. An occupational hygienist assessed exposure to acrylate compounds on the basis of the questionnaire information, earlier industrial hygienic measurements at dental offices, and previous studies of exposure conditions. Exposure to mercury and anaesthetic gases was assessed on the basis of the questionnaire data. Fecundability density ratios (FDR) for exposure were calculated with Cox proportional hazard model.
Results: The FDRs, adjusted for potential confounding factors, were slightly decreased for exposure to polymethylmethacrylate dust (0.86, 95% CI 0.69 to 1.06), methyl methacrylate (0.72, CI 0.38 to 1.39), disinfectants (0.75, CI 0.45 to 1.25), and anaesthetic gases (0.77, CI 0.39 to 1.54). The numbers of subjects exposed to these agents were small, except for polymethylmethacrylate dust.
Conclusion: No strong relation was observed between exposure to chemical agents in dental care and fertility. The associations between exposure to polymethylmethacrylate dust, methyl methacrylate, disinfectants, and anaesthetic gases and reduced fertility were weak and statistically non-significant. Based on these findings, the possibility of a slightly decreased fertility among the exposed women cannot, however, be totally excluded.

O13.3 OCCUPATIONAL EXPOSURES AND SEMEN QUALITY: A BIRTH COHORT STUDY

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Introduction: Although various occupational cohort and cross sectional studies of semen quality have been conducted, this study aimed to investigate occupational and other determinants of semen quality in a population derived birth cohort. Thus it would include exposures in small enterprises, which have not usually been studied in this regard.
Methods: The Scottish Male Reproductive Health Study surveyed a random sample of men aged 21–31 years drawn from Scottish birth records. Men who responded to the questionnaire were asked to provide a semen sample which was analysed for sperm cell count, morphology, and motility. From the job specific questions, scores for exposure to heat, heavy metals, and six categories of organic chemicals including phthalates, polychlorinated biphenyls, and other putative endocrine disrupters were derived. The relations between quartiles of occupational exposure and semen quality were analysed statistically, with adjustment for factors such as duration of abstinence. A job exposure matrix (JEM) was used to conduct further analyses on lifetime occupational history.
Results: Out of 1558 participants in the questionnaire study, 554 semen samples were returned of which 424 were analysable. Adjusted sperm cell concentration showed a significant negative exposure-response relation ($p<0.05$) with the adjusted quartiles of exposure to heavy metals but no significant relationship with the other chemical or thermal exposures.
Conclusions: As it is based on a general population survey and not derived from specific workplaces, this is a unique study whose preliminary analysis suggests an adverse effect of occupational heavy metal exposure on semen quality (consistent with occupational surveys). It indicates that exposure to lead or related metals may still pose a risk to male fertility even in the developed world, and supports the need for more detailed analysis of this dataset.

O13.4 REPRODUCTIVE DISORDERS AND BIRTH DEFECTS IN OFFSPRING AMONG MALE PAINTERS EXPOSED TO ORGANIC SOLVENTS

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Introduction: The aim of this study was to assess risks of reproductive disorders and birth defects in offspring of male painters with potential high exposure to organic solvents.
Methods: Information on reproductive outcomes, occupational exposures, and lifestyle habits was obtained retrospectively through self-administered questionnaires in a random sample of 1578 male painters and 1537 male carpenters (with little or no exposure to solvents) affiliated with the Dutch Trade Union for Construction Workers in 2001. Quantitative exposure estimates for organic solvents were derived by applying a regression model based on monitoring data among painters. Self-reported birth defects were classified into congenital malformations and functional developmental disorders.
Results: Combining information on self-reported job title at three months before the last pregnancy (period 1969–2001) with self-reported use of paints, thinners, and cleansers in this period resulted in 398 painters

with exposure to these substances and 302 carpenters without exposure. Painters had an increased risk (OR 5.9, 95% CI 1.3 to 25.9) of congenital malformations in offspring compared to carpenters. These risks were five- to sixfold increased within each exposure tertile of quantitative model predicted exposure. There was no clear increased risk for functional developmental disorders in offspring of painters. However, a positive exposure-response with model-predicted exposure was observed. Results for other reproductive outcomes (time to pregnancy, spontaneous abortion, birth weight, and preterm birth) showed no increased risks.
Conclusion: The results in this study showed a positive association between paternal occupational exposure to organic solvents and congenital malformations in offspring. Risks for functional developmental disorders in offspring were increasing with model-predicted exposure levels. The small number of cases, especially when examining different exposure levels, and the self-reported nature of exposure and outcome variables have to be taken into account.

O13.5 CONGENITAL MALFORMATION IN CHILDREN AND OCCUPATIONAL EXPOSURE OF PARENTS

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Intoduction: Assessment of occupational exposure of parents as a risk factor of congenital malformation (CM) in children.
Methods: Case control study was carried out in Moscow during 1985–92 of follow up period. Cases: 550 newborns with CM who died during perinatal period—stillbirth and death during the first week of life (ICD-10 codes: Q87; Q89.7–40.5%, Q00-Q07–24.7%, Q20-Q28–11.6% etc). 1778 controls were randomly selected out of healthy newborns born at the same time. Parents in both groups were asked by mail on occupational history, demographic and social data, lifestyle (including smoking habit and alcohol consumption), and medical history of the family. Folacic acid was not asked because it becomes widespread in Russia after 1995. Stratification analysis for unmatched series helped to control confounding factors.
Results: At least one of the parents was occupational exposed in 165 cases versus 295 controls. Odds ratio (OR) for CM was 2.15 (95% CI 1.7 to 2.7). OR was higher when a mother was exposed. In families with pathological heredity, implications of their exposure to occupational risk factors were stronger than in healthy families (OR = 2.80 95% CI 2.0 to 3.9 and OR = 1.63 95% CI 1.2 to 2.3). In addition, the risk of CM in newborns resulting from the parenteral occupational exposure was higher in families with low socioeconomic status and insufficient knowledge of health issues (OR = 2.91 95% CI 1.9 to 4.6). In families with high socioeconomic status OR was as high as 1.78 (95% CI 1.4 to 2.3). The highest risk of CM in newborns was when parents were exposed to chemical hazards (pesticides, organic solvents, aerosols of non-ferrous metals, formaldehyde resigns, anaesthetics, and pharmaceuticals), physical factors (ionising radiation, radiofrequency band EMFs, heating microclimate due to high temperature radiation), and to biological factors (viruses and bacterial infections).
Conclusions: Hazardous occupational factors to which parents can be exposed increase the risk of CM offspring. Negative effects of occupational factors are clearly shown in families with low socioeconomic status and complicated heredity.

O13.6 THE ADVERSE REPRODUCTIVE OUTCOME IN WOMEN STERILISING STAFF EXPOSED TO ETHYLENE OXIDE IN PUBLIC HOSPITALS IN SOUTH AFRICA

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Objective: To investigate the association between exposure to ethylene oxide during pregnancy and adverse reproductive outcomes. Population: singleton pregnancies that occurred after 1 January 1992 in women currently working in sterilising units using ethylene oxide in Public hospitals in South Africa. Outcome: adverse reproductive outcome included spontaneous abortion, still birth, pregnancy loss (spontaneous abortion or still birth), low birth weight, and combined adverse reproductive outcome (CARO) (spontaneous abortion, still birth, or low birth weight).
Methods: Retrospective information about evolution and outcome of pregnancy, maternal risk factors, and job description during pregnancy was collected using a questionnaire. Information on ethylene oxide exposure during pregnancy was derived from three sources: walk through survey, questionnaire, and direct measurements of current ethylene oxide exposure.
Results: All 10 of medical facilities with sterilising units in Gauteng and five large hospitals in other Cape Town and Durban participated. Of 114 singleton pregnancies reported, 26 were exposed and 88 were unexposed. Statistically significant associations were found for spontaneous abortion (RR = 13.54, 95% CI 1.58 to 115.9) and pregnancy loss (RR = 6.2, 95% CI 1.54 to 16.64) but not for CARO (RR = 1.69, 95% CI 0.83 to 3.44), still birth (RR = 2.33, 95% CI 0.25 to 18.66) or low birth weight.
Conclusion: An association between ethylene oxide exposure and spontaneous abortion and pregnancy loss was shown. As a result of the small number studied and few outcomes observed the power of the study was low and results should be interpreted with caution.

O13.7 REDUCED FERTILITY AMONG FEMALE HAIRDRESSERS

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Background: Hairdressers are exposed to a large amount of different chemicals when they style their customers hair. They are exposed to shampoos, hair conditioners, dyes, permanent oil, and bleaching powder. Reproductive toxic effects have been reported for some of these agents; some hair dye formulations as dibutylphthalate, ethylene glycol ethers and lead acetate, and organic solvents, nitrosamines, and formaldehyde.
Methods: A cross sectional questionnaire study of a general population of 16 907 females aged 40–47 years in Hordaland County, Norway, was carried out in 1997–99 (participation rate: 71%, n = 12 054). The classification of hairdressers was code 5141, based on the International Standard Classification of Occupations ISCO-88, and a single question ''Have you earlier in your life worked as a hairdresser? In the same questionnaire there was asked about fertility (''Have you ever had regularly intercourse without contraception in one year or more without getting pregnant?'', ''Months to get pregnant'') and spontaneous abortion. The difference in fertility between the hairdressers and the general working population was tested using a χ^2 test and logistic regression analysis where smoking was included.
Results: A total of 10 521 women gave information about occupation including 221 (2.1%) hairdressers. Among the hairdressers 37.9% reported that they had tried to get pregnant for more than one year, compared with 27.8% for rest of the population (OR: 1.6; 95% CI 1.2 to 2.1). For those who had experienced a pregnancy the OR between the groups for having tried to get pregnant for more than 6 months was 1.4 (95% CI 1.0 to 2.0). Also regarding experience of one or more spontaneous abortion there was an increased risk among the hairdressers (OR = 1.4; 95% CI 1.0 to 1.9). The results did not change materially after adjustment for smoking.
Conclusion: Work as a hairdresser seems to be associated with reduced fecundability and an increased risk of spontaneous abortion. The relation between these findings and their work environment ought to be examined further.